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The health of man's environment is vital to the well being of this and future generations; yet, abuses threaten both the natural and man-made environments. This document explores the total scope of this problem. The prime purpose of this guide is to give administrators, curriculum people, teachers, and interested citizens a statement of what might be considered essential in developing environmentally literate citizens who will be able to make decisions and choices as producers, consumers, voters, and recreationalists that will sustain a liveable environment. The responsibility for developing such citizens is seen as a function of public education. It is felt that this can readily be interwoven into the curriculum without any major content changes. A list of 179 basic ideas and concepts relevant to environment that could be taught in the areas of natural science, social science, and humanities is given. In addition, 10 processes for the effective teaching of these concepts is presented. This guide was developed by the Liberty Council Conservation Education Center under Elementary and Secondary Education Act, Title III, funds. (DB)

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CURRICULUM OVERVIEW

FOR DEVELOPING

ENVIRONMENTALLY LITERATE CITIZENS

developed by

Charles E. Roth

for

The Liberty Council of Schools

in cooperation with

The Massachusetts Audubon Society

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[1968]

Introduction

Everyday each of us is directly involved in environmental problems and decisions. Whether these day to day activities of ours are to the benefit or detriment of our life supporting environment is far too often a matter of pure chance. Most often we are totally unaware of the fact that we are even making a decision that affects the environment.

Many of these decisions involve actions so mundane that they are undertaken almost unconsciously. They seldom receive much, if an, consideration as to their implications for the health of the environment. Yet it is our environment that provides us with the materials necessary for our basic needs and desires. Abuse of the environment is brought about by far more than the actions of a few callous industrial complexes; it is the cumulative effect of all the "little" things done by each and every one of us.

Let's examine very briefly some of the aspects of regular living where questions arise that affect the quality of the environment and thus its ability to provide for basic human needs and wants. Hardly exhaustive, in fact barely an introduction, the following list is merely illustrative and suggestive of others.

Family life affects the environment. How big a family will you have? What demands will each new member make on the world's supply of food and other natural resources? Most of a child's attitudes are formed by the time he reaches school; what will you have taught your child about the world by that time? Will he have learned to respect or defile the environment? How do the families' reacreational activities affect the environment and vice versa? Do you treat most material things as expendable or reusable?

A person's work affects the environment. If a businessman, do your business costs include a legitimate figure for pollution abatement? Do you practice conservation at home, while condoning exploitive practices abroad to secure raw materials? Do you support conservation groups in your community? If a worker, does your union, with your help, work as hard for correcting any of the companies' anti-environmental activities as for fringe benefits?

The market place produces opportunities for a host of environmental decisions by you as a consumer. What products will you buy? What products will you not buy? What natural resources do these purchases and non-purchases represent? Will you choose a synthetic made of non-renewable resources or a similar product produced from renewable resources? Will you contribute to the decline of a rare animal species by buying a coat made of its fur; or will you buy a less prestigious imitation fur? What is your attitude towards packaging and its attendant solid waste disposal problem? Do you purchase with that attitude in mind? Have you ever expressed your opinion to a manufacturer on such things as packaging, planned obsolescence and other similar problems?

Choice of transportation affects the environment. What kind of transportation do you use? How much does it contribute to air pollution? What do its by-products, such as roads, railways, service stations, airfields and garages contribute to the decline of open space? What alternative methods do you have? Have you ever taken an active position toward resolving the private vs mass-transit problems?

You affect the environment as a voter. How do the candidates of your choice rate as environmentally perceptive and concerned citizens? Will they offer and support programs that will achieve and maintain a quality environment for all the people? A conservation platform is often stated by candidates for national office, do you request a statement of position on local environmental problems from candidates for local office?

To many of these and similar questions, answers that would assure achievement and maintenance of a high quality environment will have to be made almost second nature to us--instilled as part of our concept of "norm". Other questions will require conscious rational thought, much of it soul-searching and agonizing. Students of today must become equipped, as never before, with the knowledge and skills to deal with such environmental questions and many, many more. The solutions chosen will determine the course of the human species.

Preparing people to make enlightened choices about activities affecting the environment that sustains them must be a major objective of education. This aspect of education has been designated Environmental Education and has as its main objectives the development of environmentally literate citizens. These are people who are perceptive of, understanding of and concerned about the quality of the natural and man-made environments that provide the necessities and luxuries of life.

Is environmental education the same as conservation education, resource-use education or outdoor education? Yes and No. Environmental education is the broadest in scope and includes much of what has been classified in the other terms. There is a tendency among many people to use all of the terms inter-changeably. This is feasible up to a point but very confusing in some cases. Environmental education is the newest term and was coined to

indicate a broader concern than the other terms and to by-pass some of the negative images that each of the other terms conjure up. At the risk of oversimplification, an explanation of the differences between environmental education and each of the other terms is given below.

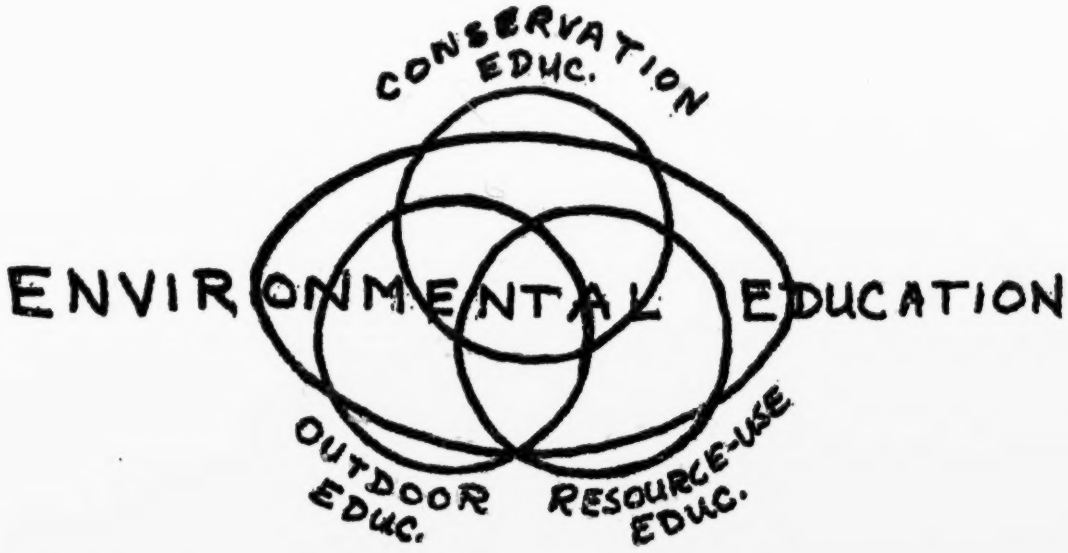
Conservation means many things to many people. Often people diametrically opposed on an environmental issue each consider themselves "conservationists" and their opponents as "vandals". There are a great many conservation organizations in the country. Each has its own bias. Some stress preservation, others land management; some extol hunting, others condemn it. Conservation education activities by these various organizations, while sharing much common ground, (each has a basic ecological orientation), often are also burdened with a large amount of their own special-interest propaganda. Environmental education promotes the same ecological underpinnings to environmental issues but strongly attempts to avoid the propaganda except to present such points of view as being among the alternatives in resolving such issues.

Resource-use education is very largely an economist's term. It tends to emerge from the social scientists interested in environment such as economists and geographers. Resource-use education stresses the nature, supply and distribution of natural and human resources and their use by mankind. As presented it is apt to be lacking in ecological foundations and tends to carry the bias that economic efficiency should be the primary consideration in resolving all resource problems. Environmental education encompasses much of the material taught as resource-use education but combines it with the ecological underpinnings and attempts to avoid its economics limitations.

Outdoor education is a very broad term which is perhaps best summarized in the statement of one of its founders Dr. L.B. Sharp. "Outdoor education is teaching outdoors those things which are best taught outdoors while teaching indoors those things best taught there." The greatest original push for outdoor education came from the physical education and outdoor recreation people. Much of their field trip and school camping activities has related directly to environmental education. In recent years there has been a great increase in the use of outdoor education methods in academic content. Outdoor education is a method. It is an important aspect of environmental education but it is only one aspect.

With these comments in mind let us summarize the strengths and weaknesses of this relatively new term environmental education It is a very integral part of a basic education. Inter-disciplinary in nature, it stresses those aspects of each so-called discipline that contribute to basic perception of, understanding of and concern for the fundamental interactions of man and his total environment--that is both natural and man-made.

Environmental education strives for ecological, economic, social and political awareness; problem solving skills and individual responsibility to prepare students for responsible action and leadership in dealing with environmental problems now and in the future. Environmental education can in many ways be considered as survival education--survival of the human species.



Perhaps the greatest weakness of environmental education is its very breadth. By definition environment is all of our surroundings. This would include the molecular environment of parts of our surroundings, cellular environments within living things, the environment of whole organisms even our stellar environment. In a very philosophical way these are indeed part of what we concern ourselves with in environmental education. For practical reasons it is necessary to work with a much more limited concept of environment.

For basic understandings, environment is limited to the surroundings of whole organisms. The key organism is seen to be man and every effort is made to "sharpen and define our understandings of the qualities of the environment that enhance individual and collective well-being" 1. Environmental education seeks to produce environmentally literate citizens, that is, citizens properly informed to be able to read their environment, diagnose its ills, apply first aid when needed and bring in experts to handle the more complex problems.

All of this introduction has been very general but many people ask us "What do you actually want taught about the environment and conservation? Shall it be taught as a special course or is it to be woven throughout the curriculum? There is so much

1.Russell E. Train, President, The Conservation Foundation, Washington, D.C. from <u>The Science Teacher</u>, Vol. 34-4, April, 1967

that could be taught and so little time to do it, what is most essential?"

The materials presented below are an attempt to answer these and other questions about the aims and goals of environmental education. The understandings and skills suggested should be woven throughout the curriculum wherever they seem appropriate. Placement of them in this guide by subject area is only one possible model.

We have made no attempt at this stage to suggest grade level placement for understandings and concepts. Curricula across the country are undergoing rapid and significant changes and grade level placements are correspondingly all askew if not passe'. We look toward design of developmental sequences rather than grade level placement.

USE OF THIS GUIDE

The prime purpose is to give administrators, curriculum people, teachers and interested citizens a statement of what might be considered essential in developing environmentally literate citizens who will be able to make decisions and choices as producers, consumers, voters and recreationalists that will sustain a liveable environment.

Secondly, it is a reference piece for curriculum committees. Members can compare and contrast their efforts against this list of concepts and understandings. Individual teachers can use it in a similar way as they prepare lesson plans or unit outlines.

There are many strategies and techniques by which these basic understandings can be developed with children; no attempt is made here to present these. Each person will find or develop his own approaches. The Conservation Curriculum Materials Center of The Liberty Council of Schools, located at Drumlin Farm in Lincoln, is a rich source of specific ideas. Also, the Conservation Coordinators and the Librarian of the Liberty Council stand willing and able to help you implement these understandings into your classwork in a wide variety of ways.

Presentation is made in terms of desired output and the input and processes needed to achieve it.

OUTPUT

The following statements are descriptive of the kind of behavior to be expected from an environmentally literate individual. They are essentially a statement of goals. The following sections indicate the conceptual inputs and processes suggested as necessary to develop a person who will behave accordingly.

An environmentally literate citizen should be able to recognize environmental problems. This means he must first have a basic understanding of the fundamental relationships between man and his biological, geological and chemical environment. Without at least a basic awareness and understanding of his bio-geo-chemical surroundings, he cannot perceive potential breakdowns in the system that result from new technology and population pressures--breakdowns which could ultimately affect the ability of the environment to support life and the quality of living.

Such an individual must think before acting, examining as many facets of an environmental issue as possible before taking his action position. He looks beyond the immediate to see what the long-range potential of any action could be. Hopefully, he will choose to reject short-term gains when they threaten long-range benefits. He recognizes that environmental problems are much easier to prevent or arrest than to reverse.

Our conservationist-citizen takes action to correct environmental imbalances through such approaches as supporting organized conservation efforts with time and/or money: suggesting, writing,

and/or supporting needed conservation legislation; asking informed questions of the right people at the proper time; expressing his opinions and concerns with appropriate government and industrial officials; and stimulating and/or participating in group action and encouraging others to identify and take action on environmental issues.

To an environmentally literate citizen, learning does not end with formal schooling. He continues to gather information about environmental issues and facts throughout his life, inevitably leading him to understand how environmental issues are often at the root of many of his other social concerns such as ghetto life, discrimination, international growth and development or war. He recognizes that knowledge and skills once acquired cannot be expected to last a lifetime - yesterdays solutions may not fit todays problems.

The environmental literate is humane. Recognizing the ecological inter-relationships of all living things, including men, he extends the concepts of humaneness to all life, striving for reduction to a minimum of cruelty and callousness to all living things

Specific property rights vary with different cultures but have their roots in our biological inheritance, for territorial behavior is widespread among animals, including our primate cousins. In this country recognition of private territories for individuals and/or groups is basic. Neutral territories are established for public uses of various kinds. Political leanings may vary concerning what percentage of national territory should be devoted to private or public ownership, but an environmentally literate citizen - regardless of his political persuasion - must treat public property and the private property of others with the same respect and stewardship he extends to his own most revered property.

The environmentally literate citizen has a keen sense of stewardship. He maintains and improves the fertility and beauty of his home area whether it be a city block or a country farm. He recognizes a need to use the environment fully but also an obligation to pass it on to the future with as little damage and as much improvement in quality as possible.

Developing personal maturity is one of the most difficult aspects of environmental literacy, for it is necessary to become increasingly less self-centered and more willing to assume responsibility for the good of the group and society in general. This frequently means a willingness to curtail some individual rights and privileges to certain resources for the long-range public good.

The environmentally literate citizen is concerned with the quality of life for all and he recognizes the finite limitations of the earth's resources. He realizes that there is an optimum relationship between human numbers and natural resources at any given time. If only man will consciously limit the size of the family he engenders now. If not, there is a near certainty of reduced quality of life and even extinction of the human species.

The immense vastness of geologic time and the relative shortness of human generations suggest that there is a long future ahead that will provide quality opportunities for untold billions of people each in his own time.

He also recognizes that education is not limited to societal institutions such as schools and colleges; it begins and continues in the family, for better or for worse—indeed most attitudes about environment are formed before entering school. He transmits much of his environmental literacy to his children through his own, often unconscious, actions. Thus he attempts to develop his family as an integrated unit, recognizing it as the basic unit of our human social community.

The environmentally literate recognizes that change is a basic law of life and that diversity helps regulate rate of change. Diversity also provides psychological stimulation. Thus our E.L.C. works to maintain diversity in the total environment both natural and man-made. The urbanite often seeks diversity from man-made landscapes in parks and natural scenery; the rural dweller may seek the man-made diversity of town and city.

Finally, our environmentally literate citizen is continually examining and re-examining the values of his culture in terms of new knowledge about man and about resources. He then seeks to change values that are creating environmental conflicts. In the words of aldo Leopold, he continually seeks "a state of harmony between man and land."

INPUT

In order to achieve the desired output of environmental literacy, students have to grapple with certain basic ideas. They must ingest them, digest them, and incorporate them into the very fabric of everyday thought and action. Concepts that are relevant to environmental literacy can be found in every part of the school curriculum. Environmental education is essentially inter-disciplinary. It is an integrating factor in fact that can give relevancy to otherwise rather abstract disciplines.

However, the major core of environmental concepts come from the areas generally classified as natural sciences, social sciences and humanities. Our concern is with the minimum inputs for environmental literacy thus the understandings listed below are limited to these core areas. The list seems long, at first, but it represents the sum of at least 12 years of schooling.

NATURAL SCIENCE AREAS

1. Life is a special organization of matter activated by energy.

2. Living things exchange matter and energy with the enrivonment.

3. Matter is for all practicable purposes finite and is recirculated continuously by such bio-geo-chemical interactions as
    a. the carbon-oxygen cycle
    b. the nitrogen cycle
    c. the rock cycle
    d. the water cycle

4. Matter exists in various states and may be transformed from one state to another.

5. The ultimate source of the energy used by living systems is the stellar system, primarily the sun.

6. There are different forms of energy.

7. Energy changes from one form to another.

8. Energy may be transformed but it is neither created nor destroyed.

9. Energy changes may be either helpful or harmful to living things depending upon the situation and the amount.

10. Energy is passed unidirectionally through living systems and is rapidly dissipated according to the laws of the thermodynamics.

11. Plants use energy from the sun to make food.

12. Some of the energy stored in plant-made food is distributed to animals by way of food chains and food webs.

13. Environment is the sum of the conditions and influences which affect the life and development of living things.

14. There are characteristic environments each with its characteristic life forms.

15. All individuals have certain basic needs such as air, food, water, and a suitable climate.

16. All living things depend upon the environment to meet their basic needs.

17. The environment is undergoing constant natural change at varying rates of speed due to such factors as

    a. weathering and erosion
    b. elevation and subsidence
    c. atmospheric composition and weather

18. Living things are adapted by structure and function to the environment.

19. Life forms change in response to environmental change either through adaptation or elimination.

20. Life forms are undergoing constant change through genetic variability and evolutionary development.

21. Life forms exhibit varying ranges of tolerance to variations in environmental factors. When such ranges of tolerance are exceeded for periods of time, the organism dies. Mutant offspring with a different range of tolerance may survive.

22. Within the tolerance range is an optimum area where the creature functions most satisfactorily. No species encounters in any given habitat optimum conditions for all its functions.

23. Competition may exist wherever any life requirement is available in amounts insufficient to supply the demands of all living forms present.

24. There exists in a natural community a dynamic balance between living and non-living components.

25. The most stable communities are those with the greatest diversity.

26. Environmental change is a function of the diversity therein.

27. Ability to adapt to rapid change is a factor of the reproductive potential of the organism and its range of genetic variability.

28. The only apparent constant is change. The universe is in constant motion; there are seasonal and annual changes within the solar system; weather causes constant changes on the planet earth; environments, constantly change; change is taking place in each habitat; each living community is a mixture of life forms that change in space and time; and living things are in constant change both over the ages and over the individual life span.

29. A living thing can reproduce itself but can only reproduce another living thing that is like itself.

30. The broad characteristics of a living thing are laid down in a genetic code - an open system in which a vast complex of genes affect each other and processes of development strongly affect how the organism develops.

31. Similarities and differences in size and structure exist between individuals within each species.

32. Many of the changes in environment we are now creating have delayed effects on human beings who are limited in their biological adaptability.

33. Each living thing has a breeding potential which is the sum of all the factors which contribute to the growth in numbers of its species over time.

34. Some species have a high annual breeding potential while others have a low breeding potential.

35. Factors of the environment limit the breeding success of any species. The sum total of these factors equal environmental resistance.

36. The population of any species is the result of the biotic potential minus the environmental resistance.

37. The size of population that any environment can support in any given period of time is limited. Such carrying capacity of an area for a species is dependent upon the availability and distribution of food, water, cover and space.

38. Every plant and animal makes its own function in the ecosystem.

39. The parent material of the soil is mineral.

40. Soils are a combination of minerals, living organisms, dead organic matter, water, and air.

41. The mineral content of the soil is a major factor in the growth and health of living things.

42. Food varies in nutrients according to the soil and/or water upon which the plants and animals were raised.

43. Soil is formed from rocks by geological weathering and erosion.

44. Soil is formed continuously over a long period of time by natural forces.

45. Soil is a reservoir that can hold water.

46. Physical, chemical, and biological processes produce nutrients in the soil which may be used by plants.

47. Soil is eroded by wind and water.

48. The rate of erosibility of soil is determined by texture, slope, moisture content, cover, and sometimes animal activity.

49. Physical characteristics of the soil govern its suitability for such non-farming uses as building construction, road construction, and sewage disposal.

50. Minerals are unevenly distributed within the earth's crust.

51. Some minerals are widely distributed in large quantities but require much energy to concentrate them.

52. Mineral fuels and lubricants are destroyed as such through use.

53. Combustion of mineral fuels results in the release into the air of gases some of which are harmful to living things.

54. The seas are vast storehouses of minerals, mostly untapped.

55. Geologic erosion and sedimentation are natural constructive forces fundamental to the building of soil.

56. All fresh-water resources originate as precipitation in a fairly pure condition.

57. The force of gravity always tends to pull water down toward lower levels; in response to this pull, water generally exerts force.

58. Water tends to cling to earth particles and to spread through earth materials by capillary action.

59. Water readily dissolves and carries away a wide range of substances; and moving water picks up and carries in suspension particles of undissolved materials.

60. When moving water slows down it tends to deposit some of its load; and when it speeds up, it can pick up more material.

61. Water is indispensable for all living things.

62. Water is unevenly distributed geographically and the quantity of water in any locality varies from time to time.

63. Water is a very active and mobile resource; it is hard to capture and keep where it is wanted or to keep it out of places where it is not wanted.

64. Water is variable in quality.

65. Through the processes of evaporation, condensation and precipitation, water is distributed about the earth as masses of air and water vapor move across the surface of the planet.

66. Living things can normally respond to a stimulus.

67. Behavior consists of responses to stimuli from the environment.

68. Habits and learnings result from inter-actions of inherited structures with stimuli.

69. The environment produces stimuli that influence the behavior of an individual.

70. The behavior of an individual stems from inter-actions of heredity and the physical, social and cultural environment.

71. All individuals die in time, so do all species.

72. Man's activities have hastened the extinction of many species and endangered the continuing existence of many others.

73. Man is an integral part of the biosphere along with all other living things.

74. Man, himself, may well be an endangered species because of his own actions upon the environment.

75. Modern man is one of the few, if not the only, species that generally acts in such a way as to put individual survival and comfort ahead of species survival.

SOCIAL SCIENCE AREAS

1. Man is an animal

2. Man is a social animal with a generalized preference for high density living.

3. Man is a territorial animal.

4. Man is an animal with an extended sense of past and future time.

5. Man is an integral part of the natural environment and is constantly affecting it.

6. Man is the only animal that can successfully alter its environment in a significant way.

7. Man can foresee many of the consequences of his management of his environment.

8. Human needs and desires are generally greater than the supply of natural resources available to meet them.

9. Nothing of material nature is a resource for man until man has a use for it or attaches value to it.

10. Man uses the elements and products of the land and water in his work of producing for others and himself.

11. Some people are producers of materials and equipment. All people are consumers of the materials and equipment.

12. The economy of a region depends upon the utilization of its resources and technology.

13. Man modifies the environment through technology.

14. Technological "solutions" to technologically induced environmental problems often create new problems of their own.

15. Economic resources from which income may be derived depend upon the human and natural resources of a community and their wise use.

16. Income comes from individual efforts in contributing to production of goods and services.

17. Conflicts of interest can be detrimental to best utilization of natural resources.

18. Phenomena associated with societies and people grow exponentially if they are not restrained.

19. The standard of living of a people is related to the general knowledge that the people possess.

20. As populations increase or as resource supplies decrease, the freedom of the individual to use the resources as he may wish decrease irrespective of the form of government.

21. Nations decline as they fail to adapt to new events or conditions.

22. Soil indirectly supplies most of man's food, shelter and clothing.

23. The erosion and misuse of productive top soil has helped to cause the disappearance of some nations.

24. Change in the fertility of surface soil have caused shifts in world populations.

25. Fertile soil was partially responsible for the pattern of development and the speed of advancement of civilization.

26. Man both accelerates and retards the erosion of the soil.

27. Man both destroys and builds up the fertility of the soil.

28. The welfare of people is affected by the way land is used.

29. The distribution and supply of water influenced where man wandered and settled.

30. Supply and availability of water at any given point are variable and may become uncertain.

31. World trade, foreign policy and international relations are greatly influenced by the availability of minerals.

32. Changes in cultural patterns of society affect the demand for minerals.

33. No industrialized country is self-sufficient in its mineral resources.

34. Forests yield many essential products for man's use.

35. Some lands are better suited for the growing of forests than for other uses.

36. Many communities are highly dependent upon local forests, forest industries and forest recreation for economic stability.

37. New uses for the products of the forest are being discovered through research and development.

38. Forests provide a wide variety of recreational opportunities.

39. Forests are important in helping to protect watersheds from floods and loss of water related to droughts.

40. The usefulness of water at any location may depend importantly on how adjoining and upstream lands are used.

41. The tremendous increase in population has created considerable concern about the availability of enough resources to meet expanding needs.

42. Human resources or powers can be unequally distributed in much the same way as material resources. In terms of talents, strengths, and by different groups.

43. A stable human community needs a variety of workers.

44. All people in our modern world are dependent upon the skills of farmers.

45. Climate sets practical limits on what crops and livestock man can raise.

46. Land is used in different ways depending upon the type of community and its needs and the whims of its owners.

47. Regions of extractive economic activity utilize natural resources directly as their economic base.

48. Change and development in the use of natural resources in the various regions of extractive economic activity depend upon needs and wants, education, natural distribution of resources, geographical conditions, advances in technology and prosperity.

49. Regions of extractive activity are inter-dependent with metropolitan regions and therefore depend for their survival upon transportation and communication.

50. An international pattern of trading natural resources has developed to accomodate needs because of the natural and uneven distribution of resources.

51. The processes of production, exchange, distribution and consumption of food have geographic influences.

52. The amount of land available and the number of buyers affects its price.

53. The great masses of people inhabit the most desirable places on the land containing the most favorable combinations of soil, water and air.

54. Individuals must cooperate to maintain a desirable environment.

55. Every individual has the right and responsibility for the protection of natural and human resources.

56. The family is the basic unit for the nurture of gifts and opportunities.

57. Individuals learn from each other.

58. Families within a community must cooperate in order for the community to survive.

59. Group living requires cooperation within and between groups in order to maintain an optimum physical, social, and cultural environment.

60. Customs, values and beliefs among humans are passed from generation to generation.

61. The characteristics of groups stem from the interaction between individuals and groups.

62. The culture of a group develops out of the interaction of regional, behavioral, and ethnic factors.

63. Life within a group imposes duties and responsibilities as well as entailing rights and privileges.

64. The life of an individual is affected by commonly accepted rules. Within the limits of acceptable rules, individuals can develop self-respect, respect for others and respect for property.

65. The participation of citizens in a community insures the development of a society in which all citizens can develop fruitfully.

66. Government is an interaction of custom, rule and law.

67. Local government is an invention to insure group survival, provide for stability, and provide for adaptation to change.

68. Governments are established to do for individuals and groups what they cannot do for themselves.

69. National and local units of government interact to maintain the development of the environment.

70. Man has often used his powers in ways that did not accrue to the benefit of mankind.

71. Every individual has a place to fill in his community and an obligation to work for community and environmental improvement.

72. Laws need to be enacted and enforced to provide certain limitations for an individual's interaction with environment.

73. Land use must be regulated to assure such things as a safe sanitation system and other utilities.

74. The characteristics of each acre of land may be different and they influence what its use should be and what protection it needs.

75. Man uses planning and zoning methods to define and adjust to proper land use, for some land or human uses exclude others while some can coexist.

76. Man creates institutions to develop, manage and use other resources cooperatively with other men.

77. The success of a democratic society depends upon the extent to which it is able to create an atmosphere and condition in which all human resources are maximally utilized.

78. Contrast and variety are important to mental health.

79. A recognition of beauty and quiet in the environment is necessary for a feeling of well being of many people.

80. Wilderness areas in which materially consumptive uses of the environment are not carried on have value to society.

81. Human resources are often wasted in the same sense as other resources are wasted.

82. A low-quality environment places a general drain upon the quality of the human resource in that area.

83. Every person has a right to an educated, healthy, wholesome community.

84. Job opportunities in a community frequently depend upon the intelligent use of natural resources.

85. War alters patterns of human resources and demand and supply of materials in swift and drastic ways.

86. The history of a people evolves through interaction of individuals, groups, cultures, events and environment.

87. An understanding of the historical past of a region is basic to a comprehension of the present and a search into the future.

88. We are stewards rather than owners of the resources we use.

89. Maintenance of an environment of quality, one fit for life and fit for living, is a continual challenge for man, generation after generation.

HUMANITIES - LANGUAGE AND ARTS

1. Men vary culturally in their relative sense of time - past, present and future.

2. The average Western man's limited concept of future seriously impairs the development and implementation of long range environmental planning.

3. Men have developed many belief systems to help explain environmental mysteries. These often shape the nature of his interactions with the environment.

4. Effective planning relies on a strong sense of future-time.

5. Men vary widely in the breadth of their perception of environment.

6. Man's perception of his environment is limited by the nature of his sensory receiving structures.

7. A person's perception of the environment is largely conditioned by the culture in which he is raised.

8. An individual's perception of environment determines in large measure the ways in which he will relate to it.

9. Our perception of environment is in part shaped by the works of writers, painters, sculptors and other artists.

10. Artists record those aspects of the environment which to them have meaning; thus the art of a people is an indication of their response to their environment.

11. Words are attached to units of experience and places are named in every society.

12. Language imposes meaning and orientation and is necessary to the synthesis of ideas and man's control of his environment.

13. Ideas are models of realities built upon selected aspects of experience.

14. Ideas vary widely in their degree of full representation of reality.

15. Technology determines what is possible, not what ought to be.

PROCESS

The ways by which the previously stated understandings are communicated to students will be many. This is healthy. There are, however, some processes to keep in mind as being perhaps more useful than others in effective development of environmentally literate citizens.

A. Each student should be involved in rich and varied direct experiences with the environment. This is particularly important in the primary grades but should continue throughout the school years. Increasingly, the developing student should be helped to expand his perception of environment and to seek meaning from his experiences.

B. Each student should be encouraged to express environmental experiences through scientific and/or artistic means.

C. Each student should be stimulated to identify environmental problems and explore them.

D. Each student must be provided with ample opportunity to develop skills in group communication, activity, and cooperation.

E. Each student needs to be continually challenged to expand his sense of time and sense of space.

F. Opportunities must continually be provided for development and practice of individual responsibility for environments.

G. Teachers and other responsible adults must demonstrate continually that learning is a continuing life-long process.

H. Education must be demonstrated to be relevant to day to day living.

I. Time must be given to exploring the ramifications of a wide variety of activities, to instill the habit of looking for the consequences of acting before doing the acting.

J. Inquiry method with its emphasis on problem identification, multiple working hypothesis formation, data gathering and conclusion forming should be widely utilized in all appropriate areas.

In addition to the concepts and processes which have previously been stated, it is necessary to focus attention on some broader organizing concepts. These have been cryptically stated or implied earlier in this paper but need some amplification here.

To begin with, it is essential to broaden a child's perceptual abilities and skills at all levels. He must not only look but see; he must hear as well as listen. He must, in short, be trained to broaden the scope of awareness to the massive bombardments of sensory stimuli constantly reaching us all. He must seek meaning from experience while at the same time, broadening the range of his experiences.

Environmental education will have to put greater emphasis on understanding of less commonly considered senses (such as space perception) and their implications. There must be a growing understanding that in addition to the aesthetics of space and form we must study the ways in which we experience psychologically comfortable and uncomfortable reactions to various spatial arrangements. These vary somewhat from culture to culture and are largely communicated and transmitted from generation to generation in non-verbal ways, most often at early ages. These spatial perceptions are subject to change through education. Our spatial perceptions have much to do with how we perceive other aspects of environment and help determine a number of our environmental values.

Time perception is also basic to environmental education. The breadth of the time spectrum of individuals is largely a function of culture and also has a maturation component. For many centuries, Western culture could not conceive of time reaching into the past for more than about 4000 years. On a practical level, past-time could only be conceived in terms of one's lifetime. Modern science, particularly geology, is slowly broadening the time-past spectrum for more and more people. It also helps imply a greater spectral range for time-future. Envisioning the true perspective of environmental problems requires a broad time-past spectrum, planning for solution of environmental problems an equally broadened time-future spectrum. The average American time-future span of about 20 years is inadequate for dealing with 100+ year solutions. Expanding the individual's time spectrum perception is a basic challenge at all grade levels.

Related in many ways to the time spectrum are the siamese twin concepts of Change and Continuity. Change may be the only constant. We must learn to live with it and adapt to it although this is very difficult for many people. However, change implies continuity. Change is from one condition to another. The past and present give clues to the future. Rate of change is important. For living things, rate of adaptability (indeed itself a change) to change in environmental conditions is crucial. It governs continuity and discontinuity.

Perception of relationships and interrelationships must also be thematic in environmental education. Ability to perceive these is maturational and a definite skill based on practice. Related to this is perception of causality. Without such perceptual development, environmental literacy is not possible for problem identification: ability to examine the long range consequences of given actions depend upon them.

These themes, of course, are to be found pertinent to many areas of the curriculum and are not the special province of environmental education. However, without them basic environmental education must remain superficial.

Without these perceptual skills the individual cannot internalize the foregoing concepts and incorporate them into his belief or value system. Without a sound value system his behaviors toward environment become only parts of games; he acts in ways he believes will gain approval of the peers he happens to be with at the moment or to achieve identification with what he conceives as a desirable group.

Man has needs and desires. Both are supplied by the environment. Man often confuses desires and needs and abuses the environment so that its ability to provide either or both is impaired for many people.

All men have a right to a quality environment. Vast numbers of people in both under and over developed countries are deprived of this right. Lack of education is in large measure responsible for this.

To even begin to achieve improvement in attaining this basic human right, effective environmental education is a necessity.

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